

*Idaho National Engineering and Environmental Laboratory*

# ***High Performance Computing Capabilities at the INEEL***

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# **Outline**

- *High Performance Computing (HPC) hardware*
- *Software available*
- *Personnel expertise*
- *Additional supporting facilities/capabilities*
  - AccessGrid
  - PowerWall

# **HPC Hardware**

- *Cray SV1*
- *Silicon Graphics Incorporated (SGI) Origin 2000 & 3800*
- *Sun Microsystems Sun Fire 4800*
- *Beowulf clusters (Linux)*
- *Macintosh G4 cluster*

# Cray SV1 (3 Machines)

- *Gauss (interactive access)*
  - 20 CPU, 300 MHZ
  - 32 GB memory
  - UNICOS 10.0.1.1
- *Cauchy & Euclid (batch access)*
  - 24 CPU, 300 MHz
  - 32 GB memory each
  - UNICOS 10.0.1.1
- *1st generation Cray scalable vector architecture*
- *Hybrid design - vector architecture with cache-based memory structure*
- *Emphasize parallel vector applications*



# **SGI Origin (2 Machines)**

- *Merope (Origin 3800)*
  - 64 CPU
  - MIPS R12000, 400 MHz
  - 64 GB memory, 8 GB data cache
  - IRIX 6.5
  - 4 TB Raid 5 disk storage
- *Orion (Origin 2000)*
  - 21 CPU
  - MIPS R10000, 195 MHz
  - 5.75 GB memory, 4 GB data cache
  - IRIX 6.5



# **Sun Fire 4800 (2 Machines)**

- *Mira*
  - 12 CPU
  - UltraSPARC-III, 750 MHz
  - 12 GB memory
  - Sun OS 5.9
- *Mira1*
  - 12 CPU
  - UltraSPARC-III, 750 MHz
  - 12 GB memory
  - Sun OS 5.8
  - 11 TB Raid 5 disk storage
  - 30 TB 8 mm tape library



# **Beowulf Clusters**

- *Stormcloud*
  - 42 Nodes 94 CPU
  - AMD Athlon, 1.2 GHz
  - 2 GB memory each node
  - Linux Mandrake 8.1
- *Blackhawk*
  - 16 Nodes 16 CPU
  - Intel Pentium IV, 2.2 GHz
  - 500 MB memory each node
  - Linux Mandrake 9.1
- *Nimbus*
  - 9 Nodes 18 CPU
  - AMD Opteron, 1.8 GHz
  - 2 GB memory each node
  - SuSE Linux



# **Macintosh Cluster**

- *6 dual CPU G4 machines*
  - *Core nodes - 4 machines*
    - *2 - 1.25 GHz G4 dual with 2 GB memory*
    - *2 - 1.0 GHz G4 dual with 1 GB memory*
    - *collocated on a Cisco 4000 Gb switch*
  - *Remote nodes - 2 machines networked via INEEL backbone*
    - *1 - 1.0 GHz G4 dual, 1 GB memory, Gb fiber NIC*
    - *1 - 500 MHz G4 dual, 1 GB memory, 100 baseT NIC*
- *Server*
  - *MacOS X 10.2.6*
  - *120 GB main drive, 120 GB mirrored backup system*
- *Other nodes*
  - *MacOS X 10.2.6*

# **Software Available**

- *Abaqus*
- *Advance Visualization Software (AVS)*
- *Attila*
- *The Fast Light Toolkit (FLTK)*
- *Fluent*
- *IcemCFD*
- *Khoros*
- *The Lua Programming Language*
- *MSI Materials Studio*
- *MatLab*
- *Maya 4.0*
- *Irix Explorer*
- *Irix Inventor*
- *Irix Performer*
- *NCAR Graphics Library*
- *OpenGL (Mesa)*
- *Fortran 77 & 90 (Sun, Irix, gnu, PGI)*
- *C (Sun, Irix, gnu, PGI)*
- *C++ (Sun, Irix, gnu, PGI)*
- *ImageTools*
- *The Visualization Toolkit (VTK)*
- *Xv*
- *World Toolkit*
- *Graphics Manipulation Program (GIMP)*
- *SGI Message Passing Toolkit*
- *Mpich – Portable MPI Implementation*
- *Parallel Virtual Machine (Pvm)*

# ***Personnel Expertise***

- *Performance Optimization*
- *Parallelization*
- *Visualization*
- *Virtual Reality Modeling*
- *3D Modeling*
- *Discrete Event Modeling*
- *Simulation*
- *Robotics*
- *Signal Processing*
- *Wavelet Theory*
- *Mathematics*
- *Statistics*
- *Numerical Analysis*
- *Control Systems*
- *Scientific Data Management*
- *Data Acquisition*
- *Data Reduction Analysis*
- *Database Management*
- *Nuclear Engineering*
- *Wireless Communications*
- *Geographic Information System (GIS)*
- *Web Related Development*
- *System Administration and Support*

- *AccessGrid*
  - 3 Camera's
  - *Interactive Microphone*
  - *AccessGrid 1.2*
  - *Distributed PowerPoint*
  - *Virtual Network Computing (VNC)*
- *PowerWall*
  - 6 projectors
  - 6 Dual AMD Nodes
  - *Linux Mandrake 9.1*
  - *8 Megapixel resolution*

